Physics S1

Newtonian Physics

Physics S2

Electromagetic Spectra

Every day <u>each</u> group will need:

- **One physics textbook**
- **One computer**

Each activity includes:

WDYS

WDYT

Investigate

Physics Talk

Checking up

Physics to Go

Chapter 5: Let Us Entertain You

3/18/14

Chapter Challenge (p. 480)

5 2-4 min (Just sound + light)

5 (first 2) Sound – make the instruments, voice, Part can be prerecorded

5 (+2/ea above) Light – Laser or regular lamps

5 Entertain

10 Explain the physics 2-3min talking OR
1 page 12pt, < Double spaced

5.1 Sounds in Vibrating Strings (p. 484) 3/19/14

WDYS: There's a girl making music with a string and a can. The string is attached to the table at one end and a weight is attached to the string at the other end. There's a dog on the floor strumming a handmade instrument. The boy looks like he's freaking out because of the noise the string and the can made. A spilled soda is on the floor.

WDYT: Guitar/violin
They make different sounds by tightening the strings.
HITTING DIFFERENT STRINGS to MAKE DIFFERENT SOUNDS.
STRUM the STRINGS. PRESSING on the STRINGS. The SIZE of the STRING.
HANDS ARE CLOSE to the BASE of the GUITAR NECK

5.1 Sounds in Vibrating Strings (p. 484) 3/19/14

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.1 Sounds in Vibrating Strings (p. 484) 3/19/14

Investigate:
Follow ALL safety precautions.

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.1 Sounds in Vibrating Strings (p. 484) 3/20/14

Physics Talk (p. 486)

To produce sound something has to vibrate.
Shortening the string it increases the pitch.
Length + Tension AFFECT the pitch
When you pull the string tighter the pitch RISES
Creats more tension.
Short tight strings, VERY high pitch, long looser strings
VERY low pitch.
STRUCK SURFACES ACT SIMILAR to STRINGS when they VIBRATE

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.1 Sounds in Vibrating Strings (p. 484) 3/20/14

Checking Up (p. 487) # 1-4

Physics to Go (p. 490) # 1-4, 6-8

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.2 Making Waves (p. 492) 3/21/14

WDYS:

WDYT:

5.2 Making Waves (p. 492)

3/21/14

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.2 Making Waves (p. 492) 3/21/14

Investigate (p. 492)

Be careful to not overstretch the slinky.

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.2 Making Waves (p. 492) 3/25/14

Physics Talk (pp. 498-502)

Read on your own and take notes in your team noteboook.

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.2 Making Waves (p. 492) 3/25/14

Checking Up (p. 502) # 1-3

Physics to Go (p. 505) # 1-6, 10-14

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.3 Sounds in Strings Revisited (p. 508) 3/26/14

WDYS: People on a stage playing string instruments, harp and a homemade w/broom, box, pulley – strings are wavy so they are being played/making sound
Many things say "standing wave", cat, person sleeping, Music notes

WDYT: Looser string moves further + makes deeper sound
tighter string moves less so makes a higher pitch

5.3 Sounds in Strings Revisited (p. 508) 3/26/14

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.3 Sounds in Strings Revisited (p. 508) 3/26/14

Investigate

Follow all safety procedures.

This procedure should take about 30 min .

$$v = f\lambda$$

$$v_{\text{velocity}} = f_{\text{frequency}} \cdot \underset{(m)}{\text{wavelength}\ (\lambda)}$$

$$(m/s) \qquad (1/s)$$

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508) 3/27/14

Physics Talk (p. 510)

Frequency: how often something happens

Wavelength: how long a wave is

Lambda

$v = f \cdot \lambda$

$(m/s) = (1/s)(m)$

v
f | λ

Herz $(1/s)$ (s^{-1})

Frequency and wavelength have an inverse relationship: $f \downarrow \lambda \uparrow$, $f \uparrow \lambda \downarrow$

Pitch and frequency have a direct relationship

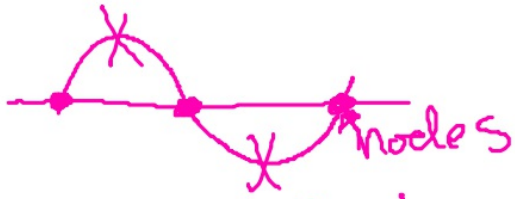
$f \uparrow$ $p \uparrow$

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508) 3/27/14

Tension and frequency have a direct relationship

String thickness and frequency have an inverse relationship



Length of string or spring

L = length of string

n = number of antinodes (standing wave)

$$L = \frac{n\lambda}{2}$$

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508) 3/27/14

Checking Up (p. 514) # 1-4

Physics to Go (p. 517) # 1, 2, 3, 5, & 7

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.4 Sounds from Vibrating Air (p. 518) 4/08/14

WDYS: 2 boys + 2 girls making music w/ pipes, bottles, whistling, straws, they are seated or kneeling, they are blowing air with their mouths into the objects, cat dislikes the cacophony, plant watered by boy's saliva

WDYT: different sizes produce different sounds
shorter - higher, longer - lower because it takes longer for the sound to get out

5.4 Sounds from Vibrating Air (p. 518) 4/08/14

IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.4 Sounds from Vibrating Air (p. 518) 4/08/14

Investigate

Please exercise caution when working with the glass test tubes.

Do:
Parts A & B
Part C if time remains today.

IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

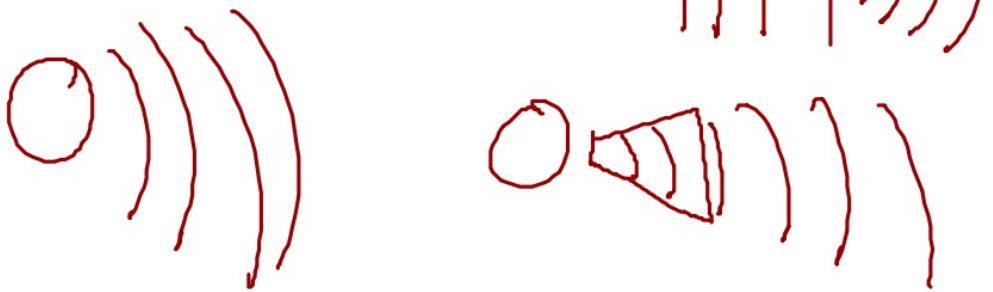
5.4 Sounds from Vibrating Air (p. 518) 4/09/14

Physics Talk (p. 521)

Compressional wave - pieces push on each other

Longitudinal wave - travels along the medium

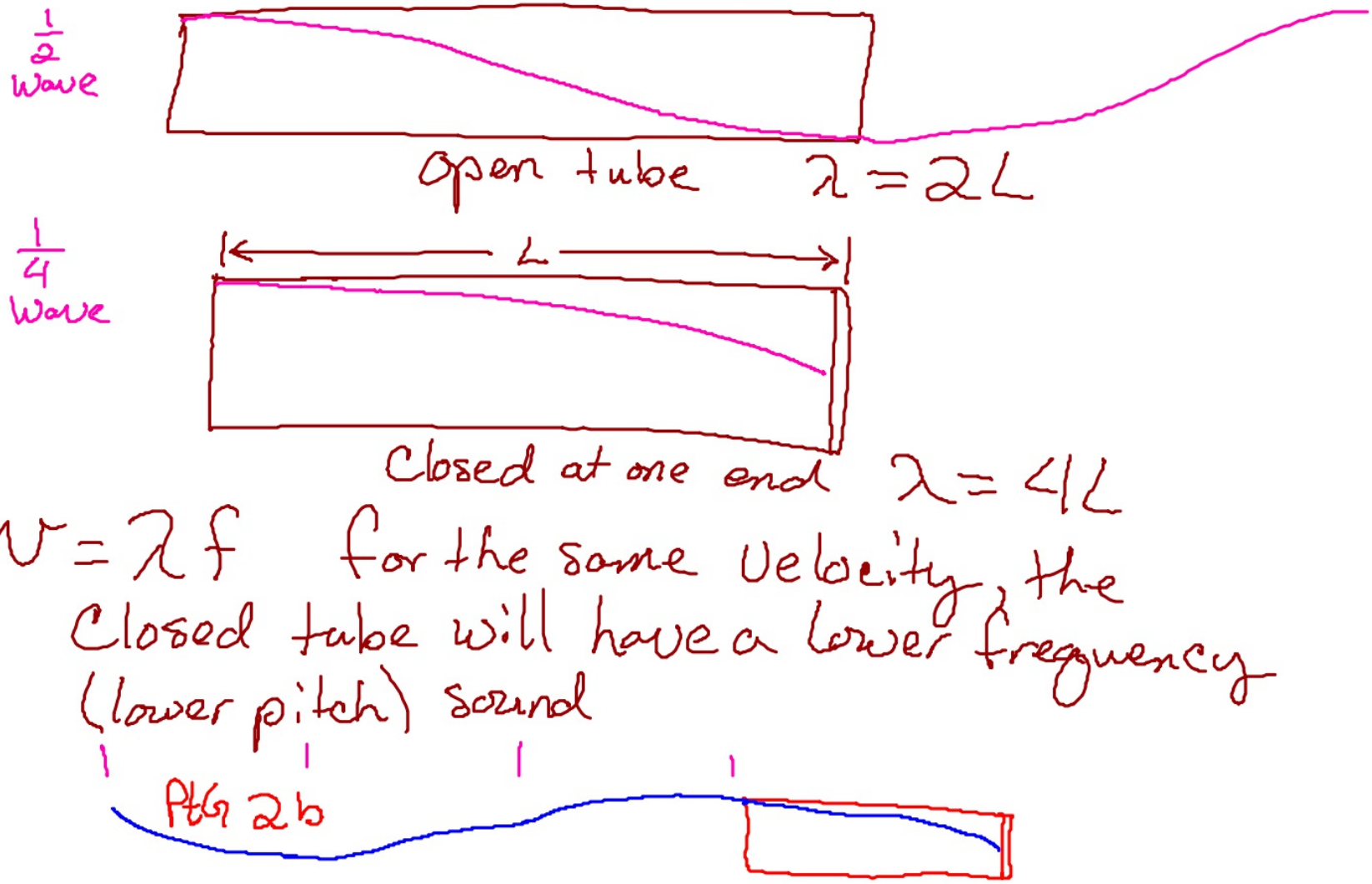
Wave diffraction - the wave bends around an obstruction passing through after an opening



IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.4 Sounds from Vibrating Air (p. 518)

4/09/14



IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.4 Sounds from Vibrating Air (p. 518) 4/09/14

Checking Up (p. 523) # 1-3

Physics to Go (p. 526) # 1, 2, 3, 4, & 8

Skip 3b's drawing

IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.5 Shadows

4/10/14

Closer to the light source, the larger your shadow.

5.6 Reflected Light (p. 538) 4/10/14

WDYS: Dog whistling, guy laying on a mattress on the floor chillin' lookin' at a mirror which shows the reflection of the moon

WDYT: Light brightens the mirror so you can see yourself

Light bounces off your eyes so you can see your reflection

turn on more lights

get closer to the mirror

make sure you are directly in front of the mirror

5.6 Reflected Light (p. 538)

4/10/14

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.6 Reflected Light (p. 538)

4/10/14

Investigate

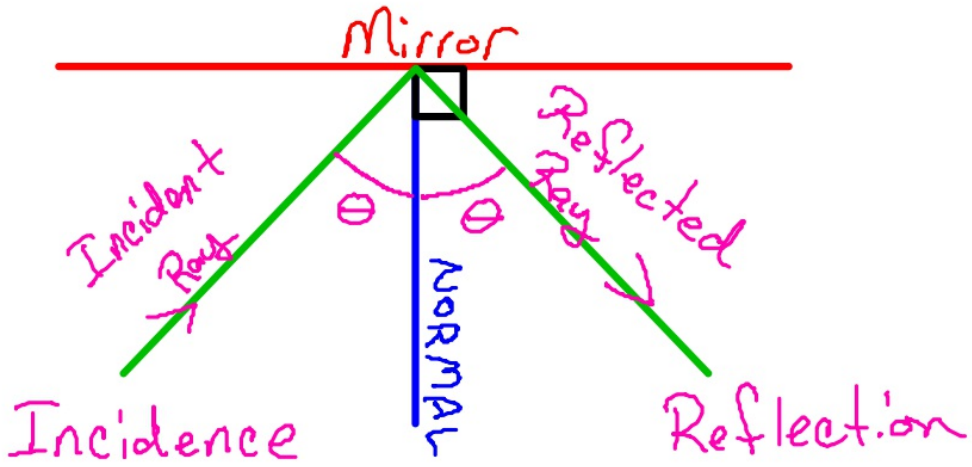
Follow all safety procedures.

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

5.6 Reflected Light (p. 538)

4/11/14

Physics Talk (p. 541)



As the angle of incidence increases, so does the angle of reflection (as measured from the normal).

Law of Reflection

$\angle I = \angle R$

The image of an object in front of the mirror appeared to be behind the mirror. The image appears to be the same distance behind the mirror as the object is away from the mirror.

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

5.6 Reflected Light (p. 538)

4/11/14

Checking Up (p. 543) # 1-3
What Do You Think Now? (p. 544)
Physics to Go (p. 546) # 1, 2, 3, 4, 7, & 8

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

In the next 45 minutes you need to do the following:

- *review* what you have learned about the creation and propagation of sound,
- *decide* on what kind of instruments you will use in your presentation, and
- *design* these instruments.

5.7 Curved Mirrors (p. 548)

4/14/14

WDYS: people standing in front of 3 different mirrors
tall skinny guy looks short + fat
short + buff guy looks tall + skinny
little girl (short) looks huge, wavy, + blobby

WDYT: images are distorted (not normal)
things appear different sizes
things appear at a different distance

5.7 Curved Mirrors (p. 548)

4/14/14

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.7 Curved Mirrors (p. 548) 4/14/14

Investigate

Follow all safety precautions .

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548) 4/16/14

Physics Talk (p. 551)

Virtual image - only seen in the mirror, not projectable

Real image - can be projected elsewhere

Concave ⟶) ⟵ convex

diverge - spread apart

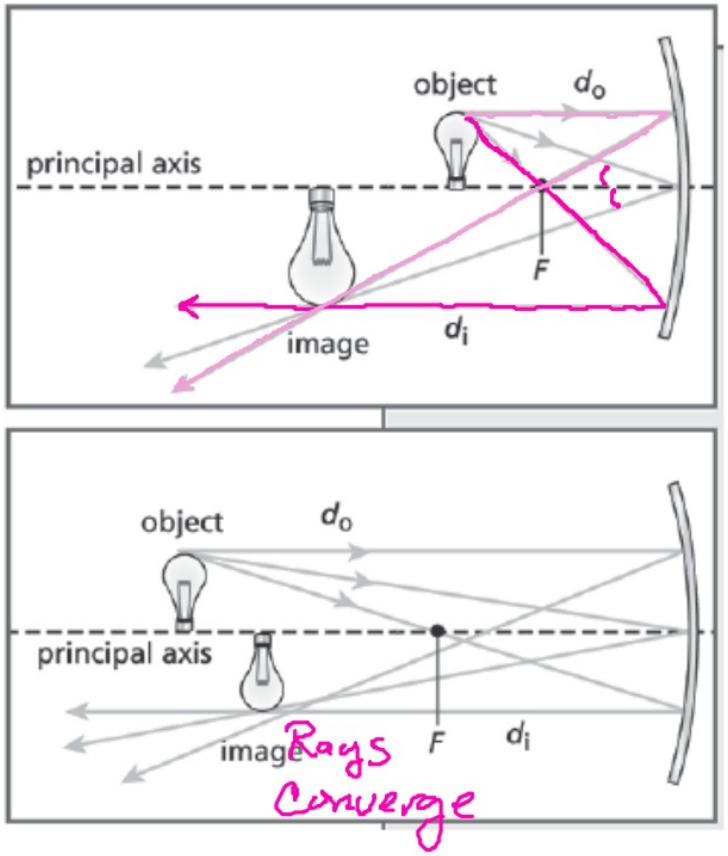
converge - come together 

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

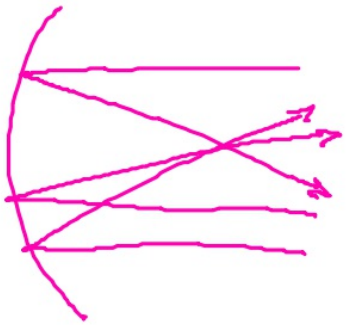
5.7 Curved Mirrors (p. 548)

4/16/14

Real images



Lightbulb projection



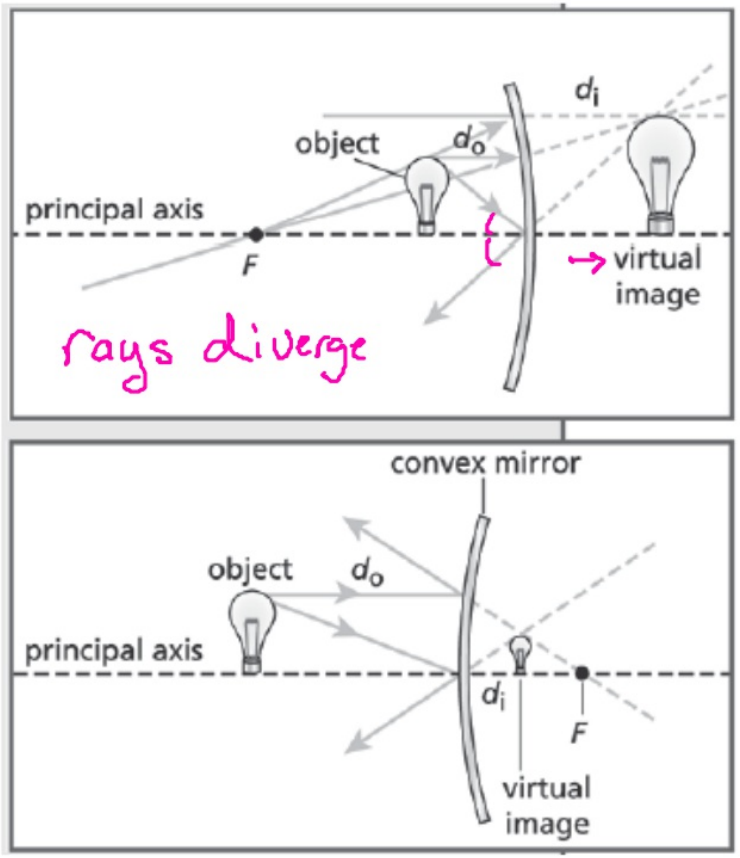
trucks projection

Rays converge

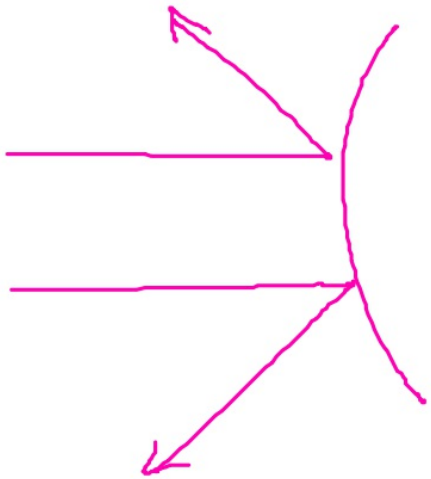
IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548)

4/16/14



Virtual images



IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548) 4/16/14

Checking Up (p. 552) # 1-3
What Do You Think Now? (p. 554)
Physics to Go (p. 555) # 1, 2, 3, 5, 6, 11, & 13

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.8 Refraction of Light (p. 558) 4/18/14

WDYS: Boy can see the fish even though there is a rock between him and the fish
Paper boat floating on the surface
Cat wants to eat the fish; fish looks freaked out
Boy has a fishing pole, tank has a leak

WDYT: Diamond scratches glass, but glass doesn't scratch glass
They look at it with a magnifying glass (jeweler's loupe)
Signature or other markings

5.8 Refraction of Light (p. 558)

4/18/14

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.8 Refraction of Light (p. 558) 4/18/14

Investigate

Observe all safety precautions.

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.8 Refraction of Light (p. 558) 4/21/14

Physics Talk (p. 561)

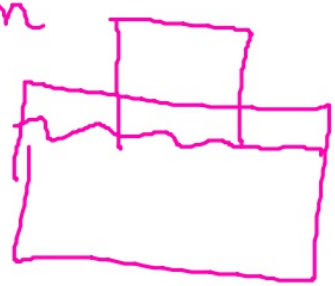
Snell's Law – Law of refraction

Different materials have different index of refraction – the bend in light through the material

Material must be translucent

Diamonds - high index of refraction

Glass - Low index of refraction



I_{ref} air 1.0003

acrylic 1.5 Water

diamond 2.5

Snell's Law $n_1 \sin\theta_1 = n_2 \sin\theta_2$

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

critical angle: the angle if incidence at which a light ray passing from one medium to another has an angle of refraction of 90^{o}.

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.8 Refraction of Light (p. 558)

4/21/14

Checking Up (p. 562) # 1-3

What Do You Think Now? (p. 563)

Physics to Go (p. 565) # 1, 2, 3, 4, 5, & 6

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.9 Effect of Lenses on Light (p. 567) 4/22/14

WDYS: Lens face-up, people standing on ring
Magnifying glass, camera, telescope, projector, binoculars, movie camera, spy glass, periscope, eyeglasses, microscope

WDYT: magnification, translucent, usually curved to magnify or reduce the image, can be combined to enlarge or reduce "zoom" (magnification), can be moved to focus the image

5.9 Effect of Lenses on Light (p. 567) 4/22/14

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.9 Effect of Lenses on Light (p. 567)

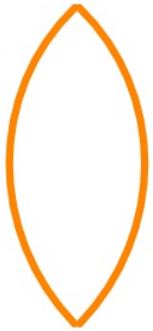
4/22 & 24/14

Investigate

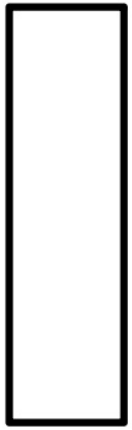
1 & 2) Make the sketches in your log.

Observe caution: the light bulbs will get very hot

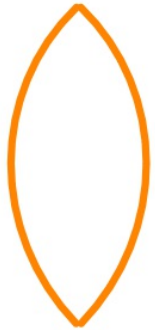
1a .



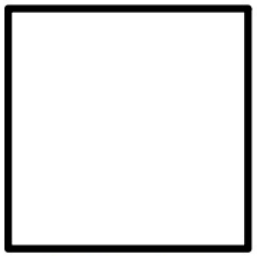
2a .



window



Lens



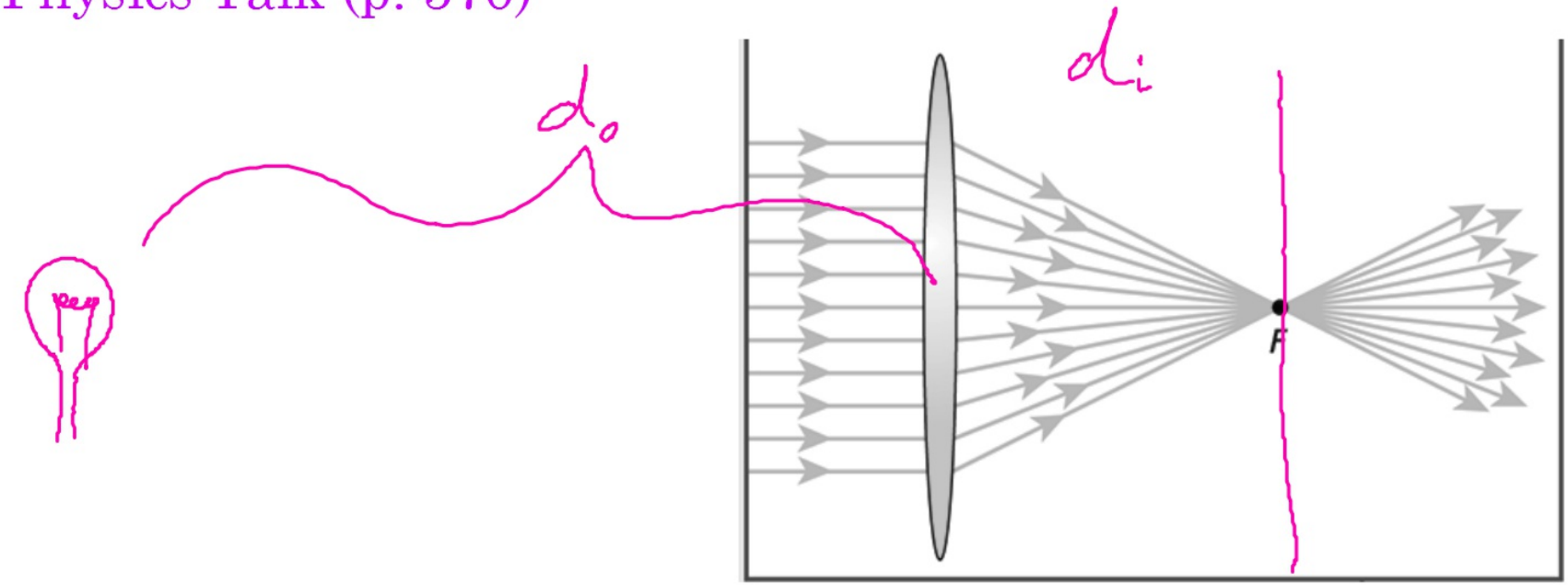
screen

Skip steps 8, 9, & 10 b-d.

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.9 Effect of Lenses on Light (p. 567) 4/24/14

Physics Talk (p. 570)



$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$\frac{1}{f} = \frac{1}{99} + \frac{1}{22} = 0.055$$

$$f = 18.2\text{cm}$$

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.9 Effect of Lenses on Light (p. 567)

4/24/14

as d_o decreases image size increases

d_i increases

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.9 Effect of Lenses on Light (p. 567) 4/24/14

Checking Up (p. 571) # 1-3
What Do You Think Now? (p. 573)
Physics to Go (p. 574) # 1, 2, 3, 5, 7, & 13

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.10 Color (p. 577) 4/25/14

WDYS: Puppet shadows of different colors, the lights are different from on the wall, cat, the ball may be changing the light somehow, cat in window & rainbow which has the same color as the shadow

WDYT: The color of the person's skin could change the color reflected because it absorbs some of the color and reflects other colors

IWBAT observe combinations of colored lights, and predict patterns of colored shadows. I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

5.10 Color (p. 577) 4/25/14

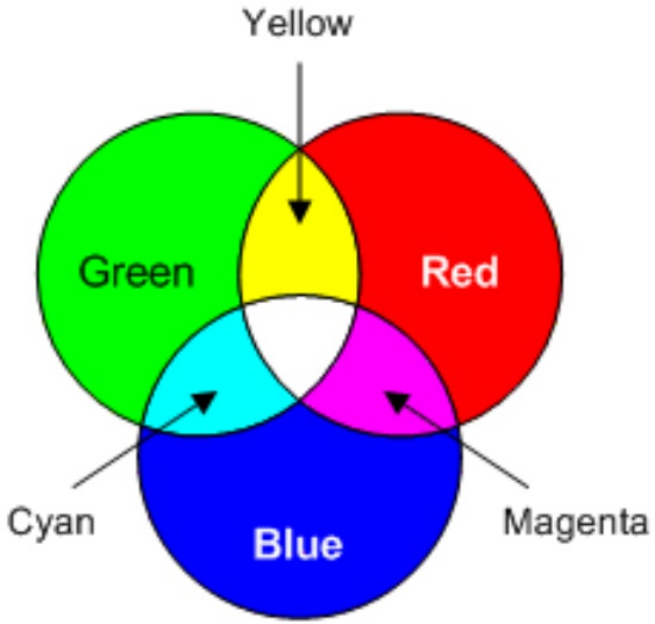
Investigation

Observe caution: the light bulbs will get very hot

1. Use any solid object that is not a rectangle.
2. Use the whiteboard as your screen.
7. Skip.

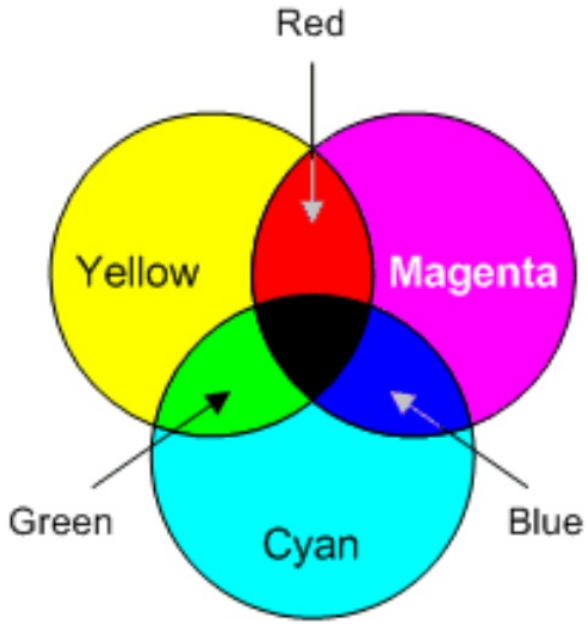
IWBAT observe combinations of colored lights, and predict patterns of colored shadows.

Additive Mixing



Lights

Subtractive Mixing



Pigments

IWBAT observe combinations of colored lights, and predict patterns of colored shadows.

Chapter 5: Let Us Entertain You

4/28/14

Read pp. 584-589

Chapter Challenge Presentation (4/29/14)

5 pts 2-4 min performance (just sound & light)

5 pts (1st two +2/ea. above two [ea. sound & light])

Sound - make the instruments, voice, part can be prerecorded

Light - laser or regular lamp

5 pts Entertaining

10 pts Explain the physics - 2-3 min talking OR 1 page, 12 pt., 1.5 line space